

**SUBMISSION INSTRUCTIONS NO. 19**

**ALTERNATE SOURCE DEMONSTRATIONS**  
**FOR REGULATED**  
**SANITARY, CDD, AND INDUSTRIAL LANDFILLS**

Developed by

Virginia Department of Environmental Quality  
Office of Waste Permitting  
Groundwater  
629 East Main Street  
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## **1.0 APPLICABILITY OF INSTRUCTIONS**

These instructions are applicable to all solid waste facilities conducting groundwater monitoring under the requirements contained in the Virginia Solid Waste Management Regulations (VSWMR), promulgated by the Virginia Waste Management Board, December 21st, 1988, as amended.

## **2.0 INTENT OF INSTRUCTIONS**

If, after statistical analysis, it has been determined that one or more groundwater monitoring constituent has been detected at statistically significant levels above facility background or the established groundwater protection standard (GPS), the Permittee may submit to the Director an Alternate Source Demonstration (ASD) defined under **9 VAC 20-80-300.A.5**.

The ASD is a detailed investigation into the cause of an apparent statistical exceedance undertaken when the Permittee has evidence to believe the statistical exceedance resulted from some reason other than a release from the waste management unit.

These instructions have been developed to assist the Permittee in developing an ASD that provides the type of data most likely to merit Department support of the ASD findings. The content of these instructions has been modeled, in part, after several existing references including:

- Solid Waste Disposal Facility Criteria Technical Manual [EPA 530-R-93-017],
- Conducting Remedial Investigation/Feasibility Studies for CERCLA Municipal Landfill Sites [EPA 540-P-91-001],

It is important to note that other data or reporting requirements contained in the sources listed above, which are not applicable to the activities included under **9 VAC 20-80-300.A.5**, have not been made part of these instructions.

These instructions have been developed as guidance, not a rule. They have not gone through public comment. They may be altered to fit facility-specific conditions where needed. The Department understands the importance of site-specific considerations and technical details in defining the final content of an ASD, and has developed these submission instructions as an outline of the suggested minimum technical content to be addressed within an ASD.

## **3.0 BENEFITS OF INSTRUCTIONS**

The Department believes developing ASD submission guidelines will:

- provide the minimum technical content of an ASD,
- decrease internal Department review time, and
- assist the regulated community with preparing technically complete documents.

## **4.0 REPORT FORMAT**

The ASD must be submitted as a stand-alone technical document, certified by a qualified groundwater professional. For the sake of consistency and to ensure an expeditious review, the information (technical content) of the ASD should be arranged in the order presented within these submission instructions as outlined in Table I of these instructions.

The sections listed herein shall be considered standard technical content. Please note that ASD submissions that do not provide the standard technical content outlined here may be judged incomplete during technical review.

The Department notes that there may be some site-specific instances where a facility's technical data may require additional or different information beyond that listed in these submission instructions as a means of more fully characterizing the technical data available and conclusions derived thereof. These instructions set no limit on the number or content of additional report sections as long as the information included directly pertains to that required of an ASD.

The administrative and technical content expected for each section of the ASD is briefly described on the following pages.

**Cover Page** – Provide the following information:

- Landfill Name
- Landfill location
- DEQ Permit #
- DEQ Region
- Name & Address of the Consultant
- Name & Address of the Permittee
- Date report submitted

**Signature Page** – This page should contain the signature & seal of a qualified groundwater professional certifying the content & findings of the ASD.

**Table of Contents** – Specify the order and organization of the report sections as outlined in Table 1 of these instructions.

**Executive Summary** – Provide a brief summary of the following technical findings of the ASD:

- Date of initial exceedance
- Location of the impacted well(s)
- Description of exceeding constituent(s)
- Description of the ASD field activity(ies)
- Description of the ASD results

**Introduction** – Discuss how the data gathered during the ASD is sufficient to support one or more of the approval criteria noted under **9 VAC 20-80-300.A.5**.

Discuss, in general terms, how the work performed pertaining to the ASD serves to prove that the exceedance noted resulted from something other than a release from the solid waste management unit.

The Permittee should indicate the ASD report was submitted in a format consistent with these submission instructions and applicable reference(s) in the VSWMR. The report should describe any limitations, as well as definitions for any technical or laboratory terminology used in the report. The report shall describe the QA/QC procedures used during ASD sampling if applicable.

**Exceedance Description** – The ASD should describe the constituent(s) which triggered the need to perform the ASD and a discussion of any prior detections of the constituent(s), noting, if applicable, any apparent trends in constituent concentration data. If applicable, discuss the physical characteristics of the constituent(s) (water solubility, density, biodegradability, presence in the native aquifer matrix, etc.).

**ASD Workplan** – Describe which of the four allowances under **9 VAC 20-80-300.A.5** the facility has chosen to explore during the ASD process. The allowances include:

- Identifying a source other than the solid waste management unit as the source of the exceedance, including natural variability in the aquifer.
- Proving the exceedance was caused by an error in sampling technique.
- Proving the exceedance was caused by an error in laboratory analysis.
- Proving the exceedance was caused by an error in statistical analysis.

**ASD Field Actions** – Describe all the actions undertaken, including the installation of new soil borings, monitoring wells (and drilling methods used), piezometers, or other temporary sampling points (and sampling methods used); geophysical surveys (the type of); sampling of groundwater, surface water (if applicable), private wells (if applicable); or any other actions deemed necessary to obtain data sufficient to complete a successful ASD.

Well completion diagrams, boring logs, surveyed elevation data, field forms and laboratory data sheets, if applicable, should be included as Appendices to the ASD.

- **Soil Sampling** – Note the locations of any soil borings taken on site as sampling points. Note the elevation at which samples were taken. Describe the field sampling procedures and note whether or not they followed existing EPA guidance.

State the name of the laboratory performing the chemical analyses, the type of analytical methods used, laboratory limits of detection (LOD) and quantitation (LOQ).

Provide a list (in table format) of those organic and inorganic constituents found at both detectable (J-flagged) and quantifiable levels during ASD sampling activities. If verification sampling was undertaken during the ASD, the results must be specified in this section. Full laboratory results should be included as an Appendix to the ASD.

- **Groundwater Sampling** – Note which, if any, monitoring wells were sampled during the ASD. State that the field sampling procedures followed were those listed in the facility's existing Groundwater Monitoring and Sampling & Analysis Plan (SAP), or where no such plan exists, the technical specifications attached to the permit.

State the name of the laboratory performing the chemical analyses, the type of analytical methods used, LOD and LOQ, and a notation that the methods used meet those listed in SW-846 as updated [9 VAC 20-80-300].

Provide a list (in table format) of those organic and inorganic constituents found at both detectable (J-flagged) and quantifiable levels during ASD activities. If verification sampling was undertaken during the ASD, the results must be specified in this section. Full laboratory results should be included as an Appendix to the ASD.

**Sampling Data Evaluation** – Describe the technical data or statistical analysis used to evaluate the ASD sampling data and, if applicable, ASD sample verification results.

***Note:** The purpose in obtaining verification/confirmation samples is to maintain an acceptable site-wide false positive rate while ensuring the statistical test used has adequate power to detect a possible release from the facility. A verification sampling strategy involves collecting a pre-planned number of additional, and independent samples. The VSWMR restrict the timeframe under which a Permittee may obtain the chosen number of independent samples; therefore, verification samples should be undertaken as soon as possible after noting the exceedance. If verification sampling is completed within 30 days of receipt of the analytical data from the initial sampling event, successful verification sampling may eliminate the need to pursue an ASD.*

*If verification sampling cannot be completed within the 30 days noted above, the results of the verification sampling can be used as a means of obtaining ASD approval only in limited situations. The verification sampling results must be combined with other site data as part of the ASD to prove that the exceedance was a result of a source other than the waste mass, an error in groundwater sampling technique, an error in laboratory analysis, an error in statistical evaluation, or natural variation in the chemistry of the aquifer.*

**ASD Conclusions & Supporting Evidence** – Provide a summary of findings of the ASD to support one or more of the VSWMR allowances noted below.

- **Other Source**

ASD may Identify a source other than the solid waste management unit as the cause of the exceedance. A “source” may be a naturally occurring component of the aquifer matrix, or an activity upgradient of the disposal area that affects aquifer quality. The “source” may be an activity within the permitted facility boundary.

**To successfully show naturally occurring metals in the aquifer, it is recommended that the facility:**

1] obtain soil, saprolite, or bedrock samples (at the screened interval from the same horizon, or in the case of bedrock, from a non-fractured horizon equivalent to the top of the water table) at upgradient points and at the exceeding well.

2] analyze the samples for total metals concentrations.

3] perform statistics to show that there is no significant statistical variation between the total metals concentration data from the upgradient aquifer matrix, versus that from the matrix at the exceeding downgradient well(s). If concentration data from the downgradient sample(s) are higher than the upgradient sample(s), a contribution from the waste mass cannot be ruled out, and ASD approval can not be issued without further supporting information. However, if the downgradient matrix material contains less total metal than the upgradient matrix, then the ASD may be adequate for approval.

**To successfully show an off-site source or an unregulated source within the facility boundary was the cause of the exceedance, it is recommended that the facility:**

1] determine that a release from such an identified source moves in a direction that would allow the impact in the exceeding well. Any release emanating from a pre-88 waste mass within the permitted facility boundary will be reviewed by the Department to

determine if the release triggering the statistical exceedance meets any of the criteria for the Open Dump designation under **9 VAC 20-80-180.B**.

Landfill gas does not classify as an “other source,” as the gas is derived from the solid waste management unit. While approval for an ASD cannot be granted as a result of impacts from landfill gas migration, landfill gas can be considered a “transport mechanism” and should be addressed on site via the implementation of a landfill gas management/remediation plan.

- **Natural Variability**

Criteria for proving natural variability in the aquifer as the source of the exceedance are based on obtaining site-specific aquifer data. It is recommended that the facility obtain:

1] soil, saprolite, or bedrock samples from two stratigraphic intervals corresponding to the interval just above the screened area (or, in the case of bedrock, from a non-fractured horizon equivalent to the top of the water table), and to the interval approximately 10 feet below ground surface. These matrix samples must be taken at each upgradient sampling point (minimum of 4 borings required), and each exceeding downgradient well.

2] analyze the samples for total metals concentrations.

3] perform statistics to determine if there is statistical variability in the range of exceeding metals concentration data derived from the upgradient points. When compared to the upgradient data, if concentration data from the downgradient well(s) lies outside (i.e. is higher than) the variation range determined from the upgradient sample points, a contribution from the solid waste mass cannot be ruled out, and ASD approval can not be issued without further supporting data.

4] If the solid waste management unit in question is an active RCRA Subtitle D facility with a leachate collection system, additional data such as Stiff Diagrams and Piper Plots may be submitted in addition to the other field data to prove a leachate component is not present in the exceeding well(s).

- **Error in Field Sampling**

To prove an error in sampling was the cause of the exceedance, the Permittee must identify what type of error occurred, and must identify what actions will be undertaken to prevent such error from happening again. Turbidity is a common example supplied in an ASD to alleviate total metals exceedances. However, to obtain approval of the ASD, site-specific comparative data must be available such as NTU readings (to measure turbidity) from the exceeding well during each sampling event. The effects of turbidity cannot be inferred without also providing the appropriate supporting field data. In addition, it should be noted that the results of dissolved metals sampling cannot be used as a form of proof of field sampling error unless NTU data are also available. The VSWMR require that regulatory decisions be based on total metals (unfiltered) data.

While rare, errors in field sampling may introduce organics into the groundwater samples. Sources such as portable generators, idling vehicles or passive gas vents, if situated close by and upwind of the sampling location, may introduce organics into the sample during the sampling process.

However, since these types of impacts are difficult to prove unless wind speed and direction information are recorded at each of the sampling locations, the Permittee must strive to employ a field sampling QA/QC program which would minimize the chance of any such field sampling errors.

If approval is granted to an ASD of this type (error in sampling), the Director may require the Permittee take remedial action such as well redevelopment, changing the sampling protocol, or replacing the affected well so that the problem does not occur during future events.

- **Error in Laboratory Analysis**

Proving the exceedance was caused by an error in laboratory analysis requires that the analytical laboratory certify and identify the actual error or failure in analytical equipment. This certification should be signed by the laboratory director, QA/QC manager or other laboratory personnel, and cannot be issued solely from a third party (i.e., independent environmental consultant).

- **Error in Statistical Analysis**

Proving the exceedance was caused by an error in statistical analysis will require the facility to identify the error type and receive Department concurrence that the Permittee has misapplied a statistical method not supported by the available site-specific data set, or sampling frequency, or failed to recognize the result represented a statistical “outlier.” Approval of this form of determination will be made after data review by the Department’s statistician.

If such approval is granted to an ASD of this type, the Director may require the Permittee change statistical methods used to analyze the site data so that the problem does not occur during future sampling events.

**Figures** – Provide at a minimum copies of the:

- USGS 7 ½-minute topographic map - showing the site location
- Site Plan - to include topographic contours, permanent structures, surface water features, a bar scale, north arrow, facility boundary, waste management unit boundary, and all monitoring wells or sampling points relevant to the ASD
- Potentiometric map
- Optional figures - may include copies of published geologic maps, US Department of Agriculture soils maps, geologic cross-sections, etc.

**Appendices** – Provide at a minimum, copies of the following:

- Boring logs for any newly installed ASD wells/borings
- Field Sampling Sheets
- Chain of Custody Records
- Laboratory Analytical Results

## **5.0 SUBMISSION TIMELINES**

The current VSWMR do not list a submission timeframe for an ASD. However, **9 VAC 20-80-300.A.5** requires that a successful ASD must be made within 90 days of the noted statistical exceedance; otherwise the next phase of monitoring must be entered. It is recommended that the ASD be submitted to the Department within 60 days of noting the



exceedance, thereby leaving the Director 30 days to issue a determination on the submission. The Permittee may petition the Director to extend the 90-day deadline for ASD approval based on good cause, as long as the request is received in a manner which allows the Director to render a decision on the extension request prior to the close of the 90-day timeframe.

**6.0 DEPARTMENT REVIEW**

**9 VAC 20-80-300.A.5.b** requires the Director to issue a determination on the findings of the ASD. To assist the Director in the determination, groundwater staff of the Waste Division will review the ASD to ensure its content meets the technical criteria noted above.

Director approval of the ASD will allow the facility to remain in its current groundwater monitoring program. If the Director finds the ASD to be incomplete or a non-compelling demonstration, a request for revisions will be made or the Director will deny the ASD. If these revisions will be submitted after the 90-day approval deadline, the Permittee must file an extension request with the Director.



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